

Workforce Development in a Large Urban Setting: Differential Access and Outcomes

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Introduction

Serving approximately 9 million students each year,¹ community colleges in the United States play an important role in preparing students for employment in an economy with strong demand for skilled workers. Traditionally, this preparation has occurred through community colleges' academic offerings and student transfers to 4-year colleges to obtain bachelor's degrees. However, community colleges also serve students through their workforce development programs, which offer direct career preparation. On this pathway, students set out to obtain an occupational certificate or applied associate degree that prepares them for "middle-skill" jobs—that is, jobs that require postsecondary training but no bachelor's degree. These jobs are often in high demand among employers and offer workers the chance to earn family-sustaining wages.²

In the United States, students of color and those from low-income households are disproportionately concentrated in community colleges, especially in workforce development programs.³ To maximize their employment opportunities, community college students need access to high-quality workforce development opportunities. The City Colleges of Chicago provide workforce preparation through their Centers of Excellence, which are industry-aligned career and technical education programs that aim to provide Chicagoans with pathways to high-demand and well-paid jobs. Each City College houses one or more of the following centers: Advanced Manufacturing; Business and Professional Services; Construction Technology; Culinary Arts and Hospitality; Education; Engineering and Computer Science; Healthcare; Information Technology (IT); and Transportation, Distribution, and Logistics (TDL).

In 2021, the PROPEL Center at the American Institutes for Research launched a partnership with the City Colleges to provide research and technical assistance to strengthen and elevate the Center of Excellence model. The cornerstone of this partnership was the development of a common framework for Center of Excellence implementation, informed by input from a range of stakeholders across the system. Described in a [Centers of Excellence Playbook](#), the framework has four pillars: (a) Leadership and Vision; (b) Industry Engagement and Curriculum Alignment; (c) Equitable Student Access, Recruitment, and Outcomes; and (4) Measurement, Assessment, and Continuous Improvement (City Colleges of Chicago, 2024). The research described in this report informs the third pillar of the framework—Equitable Student Access,

¹ Community College Research Center (n.d.).

² Holzer (2015).

³ See Baum et al. (2021).

Recruitment, and Outcomes—which focuses on ensuring that Center of Excellence programs are accessible to the greatest number of students across Chicago, and that factors like geography and student background are not barriers to enrollment.

Using data on students who enrolled in one of the nine Centers of Excellence at the City Colleges of Chicago between 2017 and 2022, this study provides baseline information about patterns in access and outcomes, and whether student characteristics (race/ethnicity, gender, and prior achievement) are related to enrollment, degree completion, and earnings. The City Colleges of Chicago can use the findings from this study to inform efforts to continuously improve their workforce development programs. The study can also serve as a starting point for future investigation into the experiences of Chicagoans as they seek opportunities to participate in high-quality workforce development training.

Centers of Excellence

Between 2017–18 and 2022–23, City Colleges of Chicago enrolled 64,269 first-time students, 57% of whom enrolled in a Center of Excellence program. Each Center of Excellence is housed at a specific college.⁴ With seven colleges and five satellite campuses throughout the city, most Chicagoans reside near at least one college (Exhibit 1). In some Center of Excellence programs, like Business and Professional Services or IT, students can take courses at any of the seven City Colleges; in other programs, like Education, courses are only available at some of the colleges. In programs such as Healthcare or Advanced Manufacturing, course offerings are limited to colleges that house those Center of Excellence programs (see Exhibit 2 for a crosswalk of colleges and Centers of Excellence).

⁴ With the exception of information technology, which serves students districtwide.

Exhibit 1. Map of City Colleges of Chicago



Exhibit 2. Center of Excellence Programs at Each City College

College	Center of Excellence	Can students at another college take courses in the Center of Excellence?
Richard J. Daley College	Advanced Manufacturing	No
Harold Washington College	Business and Professional Services	Yes
Kennedy-King College	Culinary Arts and Hospitality Construction Technology	No On a limited basis
Malcolm X College	Healthcare	No
Olive-Harvey College	Transportation, Distribution, and Logistics	On a limited basis
Harry S. Truman College	Education	Yes
Wilbur Wright College	Engineering and Computer Science	On a limited basis
Districtwide	Information Technology	Yes

Students who enrolled in Center of Excellence programs were similar to students who enrolled in associate degree–granting liberal arts programs with respect to their gender, age, and prior achievement (Exhibit 3). However, students who enrolled in Center of Excellence programs were more likely to enroll part-time and to be Black, and were less likely to be Hispanic or from another racial/ethnic group.

Exhibit 3. Characteristics of Students by Program Type, 2017–18 to 2022–23 Entering Cohorts

Student characteristic (percentage)	Center of Excellence (<i>n</i> = 36,569)	Liberal arts (<i>n</i> = 27,700)
Female	55	56
Asian	6	4
Black	34	26
Hispanic	45	50
Other race/ethnicity	11	16
White	3	4
Age (years)	22.6	21.8
Enrolled part-time	42	37
ALEKS mathematics achievement score	36.2	35.4

Note. “Other race/ethnicity” includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. ALEKS = Assessment and Learning in Knowledge Spaces.

Among Center of Excellence programs, students were most likely to enroll in Healthcare (44%) and Business and Professional Services (26%; Exhibit 4). Other Center of Excellence programs had very low enrollment rates. For example, over a 6-year period, only 401 students enrolled in IT, accounting for just 1% of all Center of Excellence enrollment.

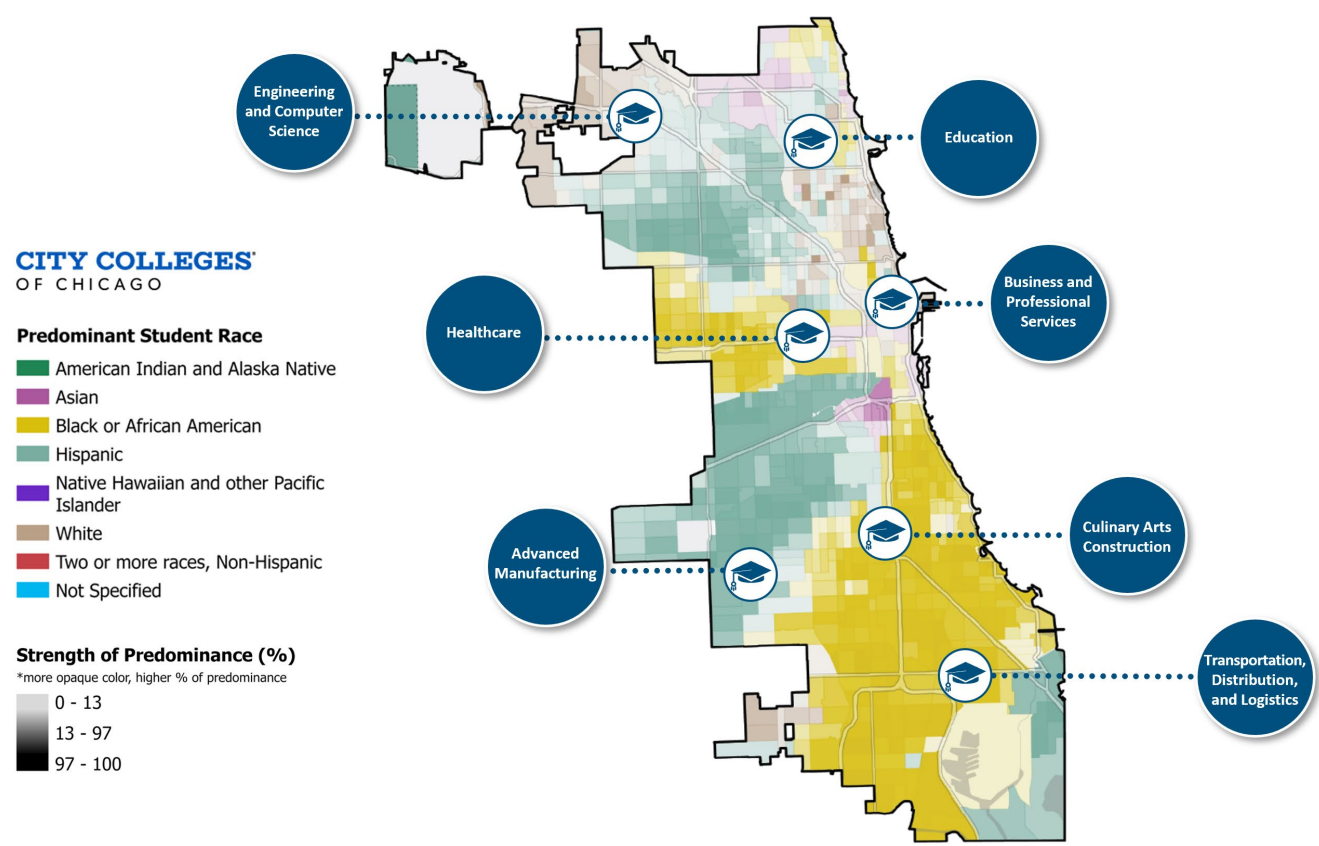
Exhibit 4. First-Time Enrollment by Program Type, 2017–18 to 2022–23 Entering Cohorts

Program	First-time enrollment	
	N	Percentage
Advanced Manufacturing	763	2
Business and Professional Services	9,434	26
Construction Technology	3,152	9
Culinary Arts and Hospitality	1,027	3
Education	871	2
Engineering and Computer Science	4,069	11
Healthcare	15,940	44
Information Technology	401	1
Transportation, Distribution, and Logistics	912	2

Because Chicago’s neighborhoods are highly segregated by race and class (or income),⁵ access to strong workforce preparation in specific fields at select colleges may be constrained for some residents. For example, Kennedy-King College (which houses Culinary Arts and Hospitality and Construction Technology) and Olive-Harvey College (which houses TDL) are located on Chicago’s South Side, where Black families are and have historically been concentrated (Exhibit 5). Richard Daley College (which houses Advanced Manufacturing) and Wilbur Wright College (which houses Engineering and Computer Science) are located on the southwest and northwest sides of Chicago, respectively, where Hispanic families tend to reside. Harold Washington (which houses Business and Professional Services) and Malcolm X (which houses Healthcare) are located in downtown areas and are relatively accessible to students of all racial/ethnic groups.

⁵ Frey (2022).

Exhibit 5. Map of the City of Chicago That Shows Neighborhood Racial/Ethnic Composition and Center of Excellence Locations



The sections that follow address research questions about student enrollment in Center of Excellence programs, as well as degree completion and earnings outcomes. The analyses looked at whether the residential segregation shown in Exhibit 5 contributed to differential enrollment in Center of Excellence programs by race/ethnicity, as well as gender and prior achievement. The study also examined differences in certificate and associate degree completion and earnings across Center of Excellence programs and by race/ethnicity, gender, and prior achievement within Center of Excellence programs. If particular Center of Excellence programs are associated with more positive student outcomes, and if there is differential enrollment in those programs based on students' background characteristics and prior achievement, City Colleges of Chicago may consider options for increasing access to high-performing Center of Excellence programs.

Research Questions

Using data on credential-seeking students who enrolled in a Center of Excellence program for the first time between 2017 and 2022, the study addressed three research questions:

1. What factors are associated with enrollment in Centers of Excellence?
2. What factors are associated with earning a certificate or an associate degree from a Center of Excellence program within 3 years of enrollment?
3. What factors are associated with the potential earnings of students who graduate with an associate degree or certificate from a Center of Excellence program?

The study team did not have access to student earnings data. Instead, it estimated earnings using historical data on earnings for certificate and associate degree holders in specific fields in the Chicago metropolitan statistical area. We refer to these as “potential” earnings. As a result, all findings related to earnings should be interpreted with caution. Methods used to address the research questions are described briefly in Box 1 and more fully in Appendix B.

BOX 1. METHODS

- **Sample:** The sample comprised six cohorts of first-time, credential-seeking students who entered City Colleges of Chicago between the 2017–18 and 2022–23 academic years. There were between 8,000 students and 13,500 students per cohort, for a total of 64,269 students.
- **Data sources:** We used student-level administrative data from the City Colleges of Chicago and publicly available data on neighborhood characteristics and earnings from the U.S. Census Bureau and the American Community Survey.
- **Measures:** Key measures were student demographic characteristics, residential address, placement test scores, enrollments, credentials earned, and potential median earnings.
- **Analytic approach:** We examined descriptive trends in enrollment, completion, and earnings. We fit linear probability or multinomial logistic regression models to examine relationships between these outcomes and student demographic characteristics, prior achievement, and neighborhood characteristics.
- **Limitations:** The analyses presented here are descriptive and should not be interpreted as causal. Results related to potential earnings should be interpreted with caution due to limitations with the data.

Key Findings

The study yielded several key findings about the factors associated with enrolling in a particular Center of Excellence program, certificate or associate degree completion, and earnings.

What factors are associated with enrollment in Centers of Excellence?

This section begins by describing differences in Center of Excellence program enrollment by race/ethnicity and gender, both within and across Centers of Excellence, and by prior achievement. There were large descriptive differences in enrollment based on these characteristics. It then discusses the results of regression analyses conducted to determine whether differences in enrollment based on race/ethnicity remained after controlling for neighborhood characteristics (e.g., distance to the college where the Center of Excellence was based and percentage of residents from racial/ethnic minority groups), gender, and prior achievement. Although there were statistically significant relationships between these factors and enrollment in a Center of Excellence program, including them in our models did not result in meaningful changes in the relationship between a given race/ethnicity and enrollment in a given Center of Excellence.

Race/ethnicity

Following patterns of racial/ethnic segregation shown in Exhibit 5, Black students were overrepresented in Center of Excellence programs housed at colleges in predominantly Black neighborhoods, like Culinary Arts and Hospitality (Kennedy-King College) and TDL (Olive-Harvey College) (Exhibit 6).⁶ Although 31% of all Center of Excellence students were Black, 54% of students in Culinary Arts and Hospitality and 58% of students in TDL were Black. Similarly, Hispanic students were overrepresented in Center of Excellence programs housed at colleges in predominantly Hispanic neighborhoods, like Advanced Manufacturing (Daley College). Although 45% of all Center of Excellence students were Hispanic, 53% of students in Advanced Manufacturing were Hispanic. In turn, Black and Hispanic students were underrepresented in other Center of Excellence programs, such as Advanced Manufacturing and Engineering and Computer Science for Black students and Culinary Arts and Hospitality and TDL for Hispanic students.

These patterns reflect the *within*-Center racial/ethnic distribution of students, which provides information about representation in each Center of Excellence program—that is, whether

⁶ These fields tend to be lower paying than other technical fields, according to occupational wage and employment statistics from the Bureau of Labor Statistics: <https://www.bls.gov/oes/tables.htm>.

students from a particular race/ethnicity were overrepresented or underrepresented in a given Center of Excellence program. Looking *across* Centers, similar percentages of students from each racial/ethnic group enrolled in each Center of Excellence program, with the exception of Engineering and Computer Science and Healthcare (Exhibit 7). Asian students were three times more likely than Black students (24% versus 8%) and twice as likely as Hispanic students and students from another racial/ethnic group⁷ (24% versus 11%) to enroll in Engineering and Computer Science. Asian students and White students were less likely than all other students to enroll in Healthcare.

Exhibit 6. Racial/Ethnic Distribution of Students by Center of Excellence Program, 2017–18 to 2022–23 Entering Cohorts



Note. The sample included 36,569 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2022–23. There were 763 students in Advanced Manufacturing; 9,434 students in Business and Professional Services; 3,152 students in Construction Technology; 1,027 students in Culinary Arts and Hospitality; 871 students in Education; 4,069 students in Engineering and Computer Science; 15,904 students in Healthcare; 401 students in IT; and 912 students in TDL. “Other race/ethnicity” includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. IT = Information Technology; TDL = Transportation, Distribution, and Logistics.

⁷ “Other race/ethnicity” includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity.

Exhibit 7. Percentage of Students in Each Racial/Ethnic Group Who Enrolled in a Center of Excellence Program, 2017–18 to 2022–23 Entering Cohorts

Center of Excellence	Race/ethnicity				
	Asian	Black	Hispanic	Other race/ethnicity	White
Advanced Manufacturing	1	1	2	2	3
Business and Professional Services	27	26	25	29	29
Construction Technology	5	8	9	9	10
Culinary Arts and Hospitality	2	4	2	4	1
Education	1	3	3	1	2
Engineering and Computer Science	24	8	11	11	14
Healthcare	38	45	45	40	38
Information Technology	1	1	1	1	2
TDL	1	4	3	2	1

Note. The sample included 36,569 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2022–23. There were 763 students in Advanced Manufacturing; 9,434 students in Business and Professional Services; 3,152 students in Construction Technology; 1,027 students in Culinary Arts and Hospitality; 871 students in Education; 4,069 students in Engineering and Computer Science; 15,904 students in Healthcare; 401 students in IT; and 912 students in TDL. “Other race/ethnicity” includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. IT = Information Technology; TDL = Transportation, Distribution, and Logistics.

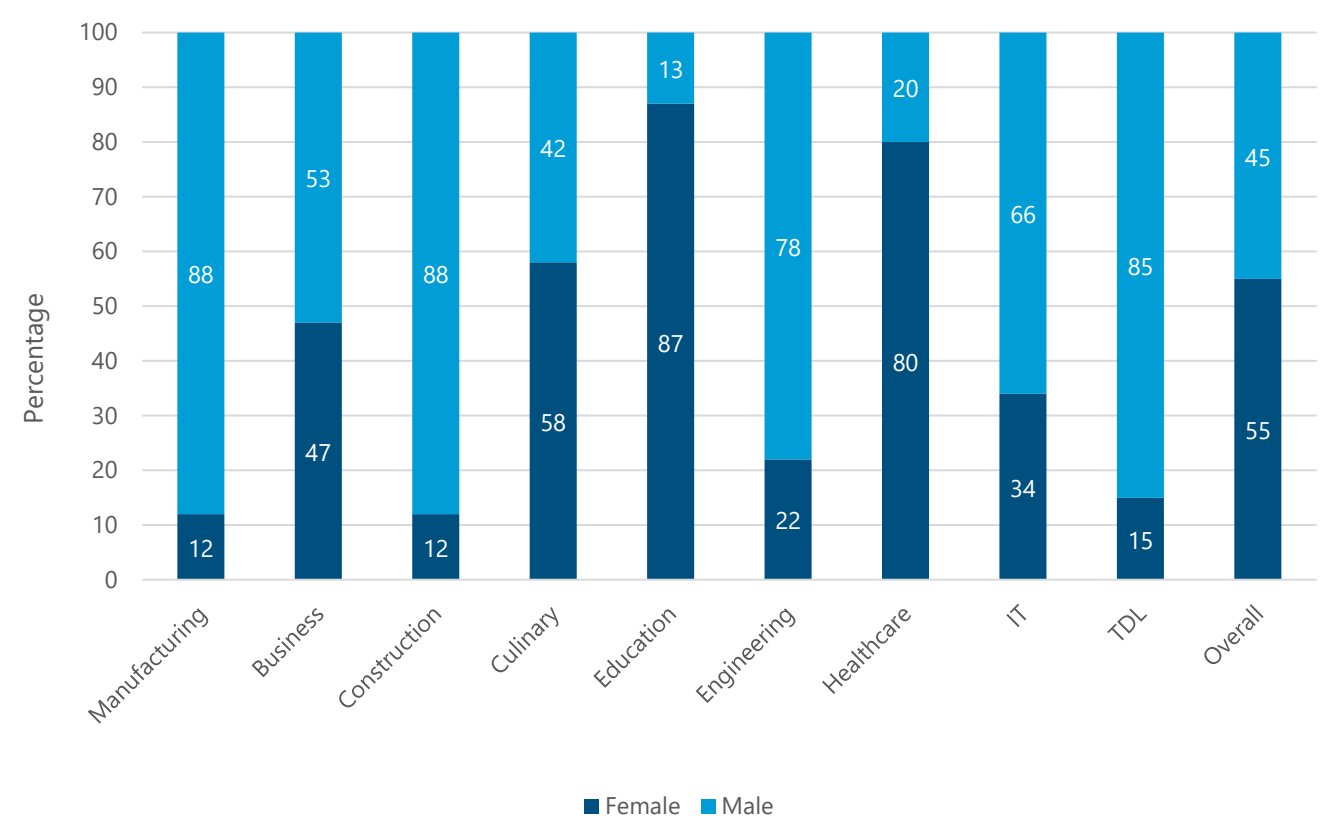
Gender

There were clear differences in enrollment patterns by gender within Center of Excellence programs. Not surprisingly, female students were underrepresented in traditionally male-dominated fields like Advanced Manufacturing and overrepresented in traditionally female-dominated fields like Education. Although 55% of all Center of Excellence students were female, only 12% of students in Advanced Manufacturing and Construction Technology, 15% of students in TDL, and 22% of students in Engineering and Computer Science were female (Exhibit 8). In contrast, 87% of students in Education and 80% of students in Healthcare were female.

Looking across the Centers of Excellence, the percentages of female and male students enrolled in each Center of Excellence program differed for nearly all programs (Exhibit 9). Female students were approximately three times as likely to enroll in Healthcare than male

students (63% versus 20%), and they were less likely than male students to enroll in Advanced Manufacturing, Business and Professional Services, Construction Technology, Engineering and Computer Science, and TDL.

Exhibit 8. Gender Distribution of Students by Center of Excellence Program, 2017–18 to 2022–23 Entering Cohorts



Note. The sample included 36,569 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2022–23. There were 763 students in Advanced Manufacturing; 9,434 students in Business and Professional Services; 3,152 students in Construction Technology; 1,027 students in Culinary Arts and Hospitality; 871 students in Education; 4,069 students in Engineering and Computer Science; 15,940 students in Healthcare; 401 students in IT; and 912 students in TDL. IT = Information Technology; TDL = Transportation, Distribution, and Logistics.

Exhibit 9. Percentage of Female and Male Students Who Enrolled in a Center of Excellence Program, 2017–18 to 2022–23 Entering Cohorts

Center of Excellence	Female	Male
Advanced Manufacturing	0	4
Business and Professional Services	22	30
Construction Technology	2	17
Culinary Arts and Hospitality	3	3
Education	4	1
Engineering and Computer Science	4	19
Healthcare	63	20
Information Technology	1	2
TDL	1	5

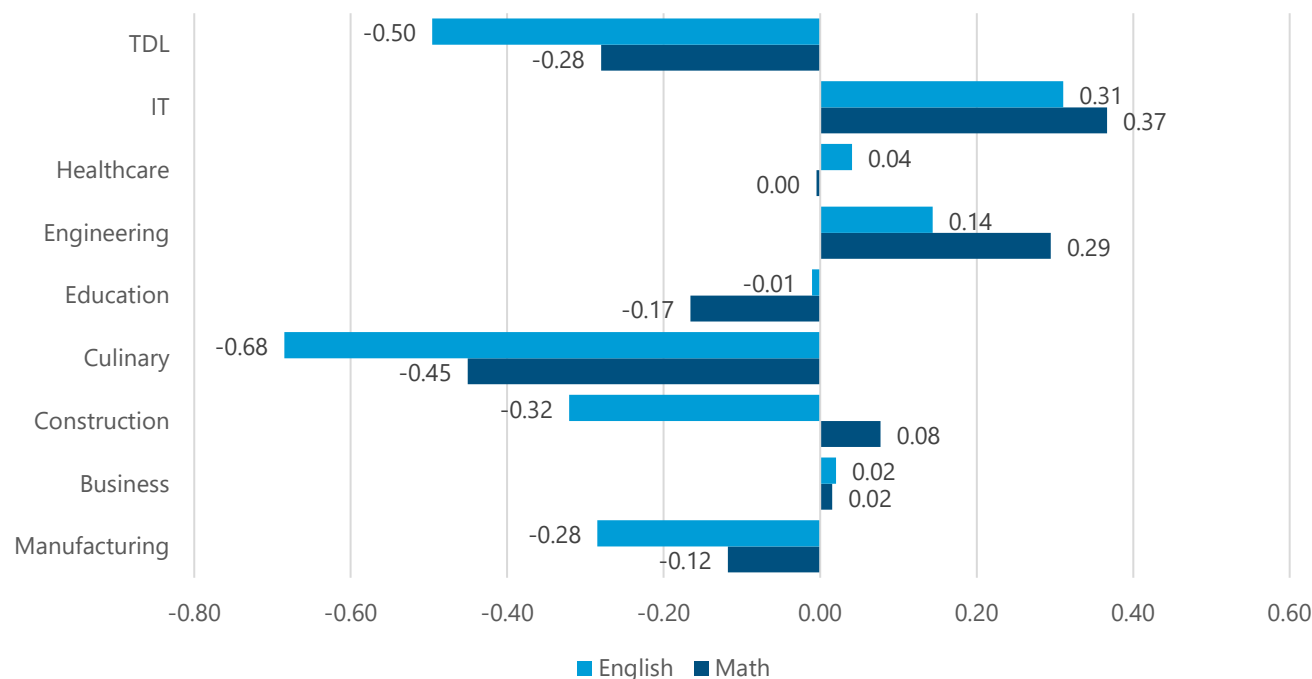
Note. The sample included 36,506 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2022–23. There were 762 students in Advanced Manufacturing; 9,420 students in Business and Professional Services; 3,145 students in Construction Technology; 1,025 students in Culinary Arts and Hospitality; 871 students in Education; 4,062 students in Engineering and Computer Science; 15,918 students in Healthcare; 400 students in IT; and 903 students in TDL. Sixty-three students whose gender was listed as unknown were not included. IT = Information Technology; TDL = Transportation, Distribution, and Logistics.

Prior achievement

Students' entering test scores varied greatly across Center of Excellence programs (Exhibit 10).⁸ Students in Information Technology and Engineering and Computer Science had the highest test scores, while students in Culinary Arts and Hospitality and TDL had the lowest test scores. Patterns in test scores across Center of Excellence programs were similar for mathematics and English.

⁸ The mathematics placement test was the Assessment and Learning in Knowledge Spaces (ALEKS) assessment developed by McGraw Hill (see <https://www.aleks.com>). The English placement test was the Reading to Write test, developed by City Colleges of Chicago (see <https://www.ccc.edu/services/placement-tests/>). Test scores were standardized on the full sample of City Colleges of Chicago students, including those who enrolled in liberal arts programs. Negative test scores can be interpreted as scoring below the mean for all entering City Colleges of Chicago students with test scores. Positive test scores can be interpreted as scoring above the mean.

Exhibit 10. Entering Test Scores for Students Who Enrolled in a Center of Excellence Program, 2017–18 to 2022–23 Entering Cohorts



Note. Test scores were standardized on the full sample of City Colleges of Chicago students to have a mean of 0 and a standard deviation of 1. The sample included 27,786 Center of Excellence students with mathematics test scores and 24,447 Center of Excellence students with English test scores. The sample sizes, for mathematics and English respectively, were 441 students and 404 students in Advanced Manufacturing; 7,099 students and 6,230 students in Business and Professional Services; 2,238 students and 2,071 students in Construction Technology; 873 students and 819 students in Culinary Arts and Hospitality; 667 students and 623 students in Education; 3,121 students and 2,557 students in Engineering and Computer Science; 12,715 students and 11,167 students in Healthcare; 275 students and 221 students in IT; and 357 students and 355 students in TDL. IT = Information Technology; TDL = Transportation, Distribution, and Logistics.

Regression models

We conducted regression modeling to understanding if factors such as neighborhood characteristics, prior achievement, and gender explained the relationship between race/ethnicity and enrollment in a given Center of Excellence program. By and large, controlling for a wide range of factors resulted in only small changes in the statistical significance and magnitude of coefficients for race/ethnicity, suggesting that there are factors that are unaccounted for that explain differences by race/ethnicity (Exhibits A1 and A2 in Appendix A).

Exhibit 11 shows how associations between race/ethnicity and enrollment in a Center of Excellence program changed after accounting for neighborhood characteristics, prior

achievement, and gender. Orange shaded boxes represent negative associations between a given race/ethnicity and enrollment in a given Center of Excellence, relative to a reference group—in this case, White students. For example, Asian students were less likely than White students to enroll in Advanced Manufacturing. After controlling for other factors, the relationship remained statistically significant but the magnitude of the difference between Asian students and White students decreased, as indicated by the down arrow. Purple shaded boxes represent positive associations between a given race/ethnicity and enrollment in a given Center of Excellence, relative to White students. For example, Black students were more likely than White students to enroll in Culinary Arts and Hospitality. After controlling for other factors, the relationship remained statistically significant but the magnitude of the difference between Black students and White students decreased, again denoted by a down arrow. Boxes without shading represent no difference between students from a given racial/ethnic group and White students in the probability of enrolling in a given Center of Excellence program.

Neighborhood characteristics—such as distance from a student’s home to the college where the Center of Excellence program was based and the racial/ethnic composition of the neighborhood—had statistically significant relationships with enrollment in a Center of Excellence program. However, the magnitude of the coefficients was very small, suggesting that distance to college was not a major barrier to enrollment (see Exhibit A1 in Appendix A).

Finally, English and mathematics placement test scores were statistically significant predictors of enrollment in most Center of Excellence programs, but the relationships were small in magnitude. Specifically, there was a positive relationship between mathematics scores and enrollment in Engineering and Computer Science, and a negative relationship between mathematics scores and enrollment in Advanced Manufacturing, Culinary Arts and Hospitality, Education, and TDL. There was a positive relationship between English scores and enrollment in Business and Professional Services, Healthcare, and Information Technology, and a negative relationship between English scores and enrollment in Advanced Manufacturing, Culinary Arts and Hospitality, and TDL. It is not clear if test scores are a barrier to enrolling in some Center of Excellence programs, or if they reflect racial/ethnic differences in enrollment patterns, which may be driven by other factors not observed in the data. (See Exhibit A3 in Appendix A for test scores by race/ethnicity.)

Exhibit 11. Change in Association Between Race/Ethnicity and Enrollment in a Center of Excellence Program After Accounting for Neighborhood Characteristics, Prior Achievement, and Gender, 2017–18 to 2020–21 Entering Cohorts

Center of Excellence	Asian	Black	Hispanic	Other race/ethnicity
Advanced Manufacturing	↓	↓		
Business and Professional Services	↑			
Construction Technology	↓	↓		
Culinary Arts and Hospitality	↓	↓		↓
Education	↑			↑
Engineering and Computer Science	↓		↑	
Healthcare		↓	↓	
Information Technology	–			
TDL		↓	↑	↓

Orange shaded cells represent a statistically significant negative relationship between a given race/ethnicity and enrollment in a given Center of Excellence program, relative to White students, after accounting for other factors. Purple shaded cells represent a positive relationship.

↓ = decrease in the magnitude of the difference in the probability of enrolling in a given Center of Excellence program between students of a given race/ethnicity and White students. ↑ = increase in the magnitude of the difference.

Note. The sample included 36,367 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2022–23. The reference group for race/ethnicity is White. “Other race/ethnicity” includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. TDL = Transportation, Distribution, and Logistics.

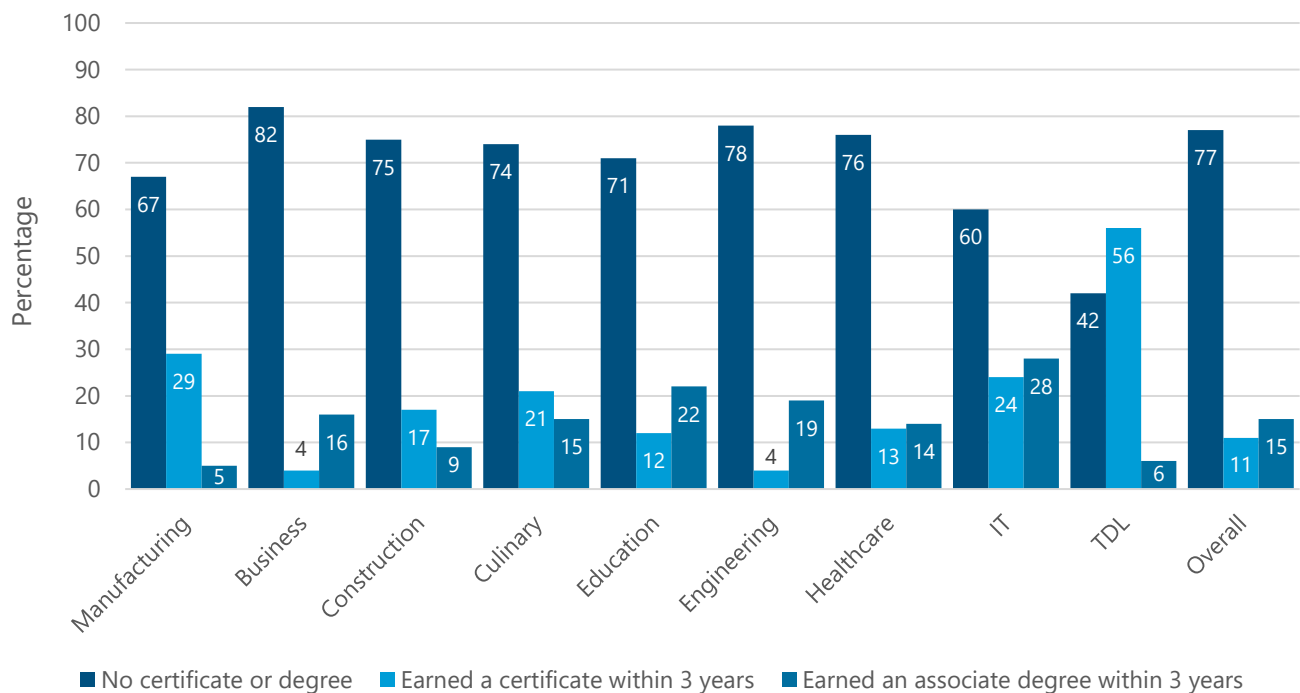
What factors are associated with earning a certificate or an associate degree from a Center of Excellence program within 3 years of enrollment?

On average, degree completion rates for students in Center of Excellence programs were quite low. Only 11% of Center of Excellence students who enrolled for the first time between 2017–18 and 2020–21 completed a certificate within 3 years, and just 15% completed an associate degree in that time period (Exhibit 12).

The highest rates of certificate attainment within 3 years were in TDL (56%), Advanced Manufacturing (29%), and Information Technology (24%). The lowest rates were in Business

and Professional Services (4%) and Engineering and Computer Science (4%). The highest rates of associate degree completion within 3 years were in Information Technology (28%), Education (22%), and Engineering and Computer Science (19%). The lowest rates were in Advanced Manufacturing (5%) and TDL (6%).

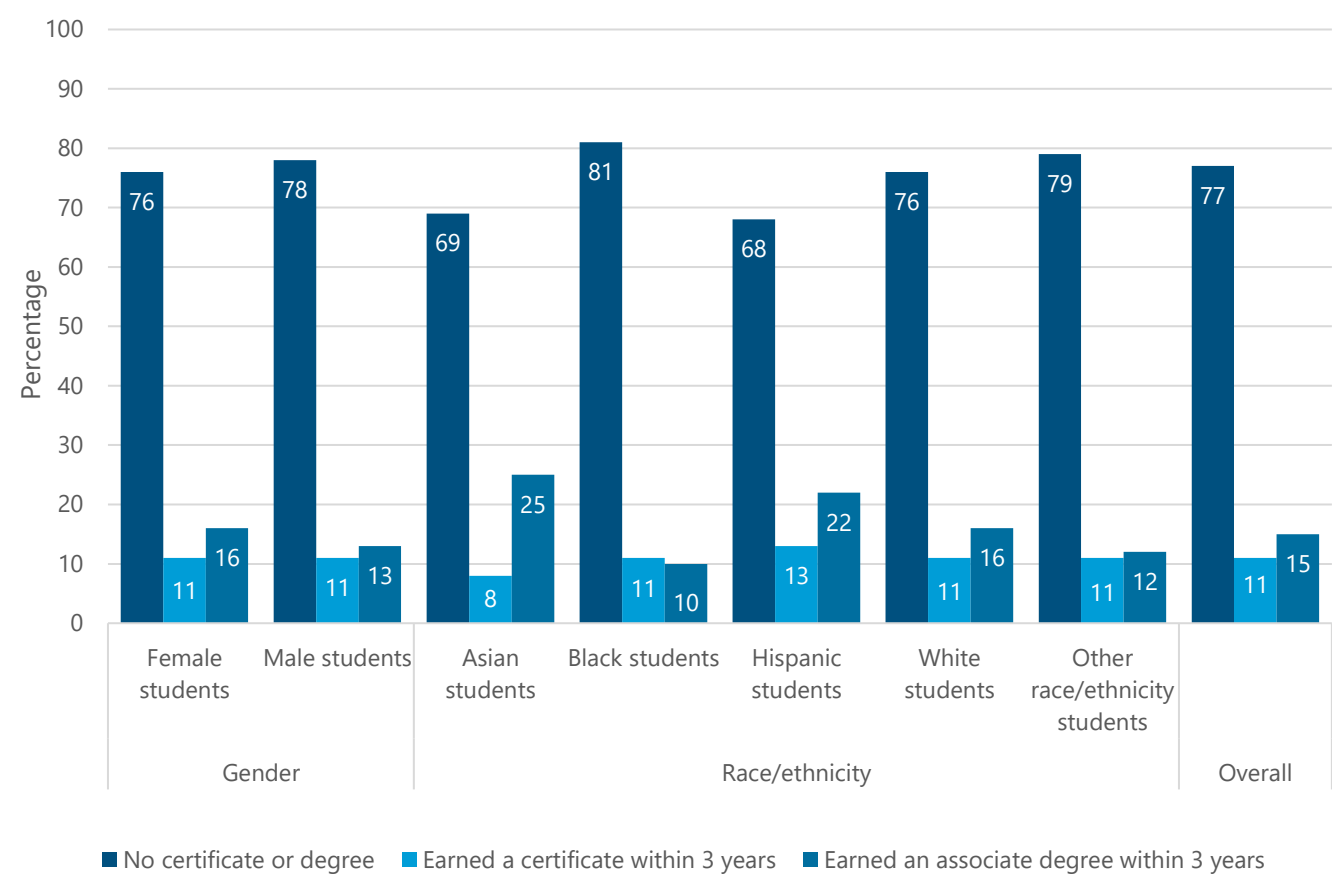
Exhibit 12. Percentage of Students in Each Center of Excellence Program Who Completed a Certificate or Associate Degree Within 3 Years, 2017–18 to 2020–21 Entering Cohorts



Note. The sample included 26,027 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2020–21. There were 422 students in Advanced Manufacturing; 6,925 students in Business and Professional Services; 2,008 students in Construction Technology; 767 students in Culinary Arts and Hospitality; 575 students in Education; 2,886 students in Engineering and Computer Science; 11,802 students in Healthcare; 134 students in IT; and 508 students in TDL. Bars may exceed 100% because students could earn more than one certificate or degree. IT = Information Technology; TDL = Transportation, Distribution, and Logistics.

There were no differences in certificate completion by gender, but female students were more likely than male students to complete an associate degree (16% versus 13%; Exhibit 13). Asian students were the most likely to earn an associate degree (25%), followed by Hispanic students (22%), White students (16%), students from other racial/ethnic groups (12%), and Black students (10%). Hispanic students were most likely to earn a certificate (13%), followed by Black students, White students, and students from other racial/ethnic groups (all 11%). Asian students were the least likely to earn a certificate (8%).

Exhibit 13. Percentage of Center of Excellence Students Who Completed a Certificate or Associate Degree Within 3 Years, by Race/Ethnicity and Gender, 2017–18 to 2020–21 Entering Cohorts



Note. The sample included 26,027 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2020–21. “Other race/ethnicity” includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. Columns may exceed 100% because students could earn more than one certificate or degree.

Regression models

We used multinomial logistic regressions to create adjusted predictions that describe the probability that a student of a given race/ethnicity would complete a certificate or associate degree, after accounting for other factors. Model 1 shows completion rates after accounting for race/ethnicity and entering cohort. Model 2 adds neighborhood characteristics, prior achievement, and gender. Model 3 adds Center of Excellence to capture variation in program characteristics.

After controlling for these factors, certificate completion rates remained low overall (Exhibit 14, Model 1 versus Model 3). There were small changes: Certificate completion rates increased by

2.0 percentage points for Asian students (a 36% change) and 1.5 percentage points for White students (a 15% change), but decreased by 1.0 percentage point for Black students (an 11% change). Controlling for student and institutional factors mattered more for associate degree completion: Associate degree completion rates declined by 6.7 percentage points (a 27% change) for Asian students and 5.6 percentage points (a 25% change) for White students after accounting for the full range of factors. In contrast, they increased by 3.0 percentage points for Black students, which represented a 32% change in associate degree completion.

In regression models, being female had a positive and statistically significant association with associate degree completion, but not certificate completion (see Exhibit A4 in Appendix A). Academic achievement had a positive and statistically significant association with both certificate and associate degree completion. For Black students pursuing associate degrees, in particular, improving academic achievement during the K–12 years may pay off in terms of higher rates of associate degree attainment.

Exhibit 14. Adjusted Predictions of Completing a Certificate or Associate Degree Within 3 Years, by Race/Ethnicity, 2017–18 to 2020–21 Entering Cohorts

Degree	Race/ethnicity	Model 1	Model 2	Model 3
		Race/ethnicity and cohort (percentage)	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender (percentage)	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender, Center of Excellence (percentage)
No degree	Asian	69.3	74.5	74.0
	Black	81.2	78.9	79.2
	Hispanic	75.9	76.4	76.3
	Other race/ethnicity	78.8	79.2	79.0
	White	67.7	72.5	71.8
Certificate	Asian	5.6	6.6	7.6
	Black	9.3	8.7	8.3
	Hispanic	8.5	8.7	8.7
	Other race/ethnicity	9.4	9.1	9.3
	White	10.0	10.6	11.5
Associate degree	Asian	25.1	18.9	18.4
	Black	9.5	12.4	12.5

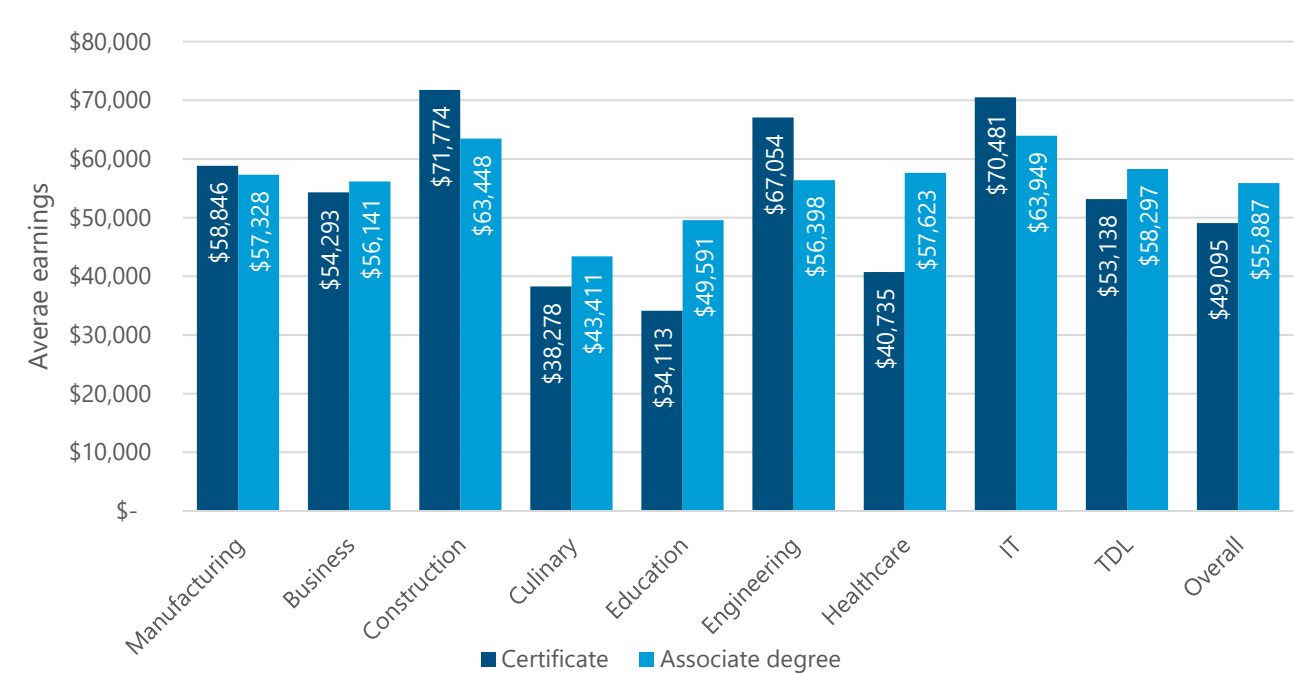
Degree	Race/ethnicity	Model 1	Model 2	Model 3
		Race/ethnicity and cohort (percentage)	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender (percentage)	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender, Center of Excellence (percentage)
	Hispanic	15.7	14.9	15.0
	Other race/ethnicity	11.8	11.7	11.7
	White	22.3	16.9	16.7

Note. The sample included 25,891 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2020–21. “Other race/ethnicity” includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. Results are from multinomial logistic regression models predicting attaining a certificate or associate degree within 3 years, relative to no degree, obtained using the margins command in STATA. Full regression results are presented in Exhibit A4 in Appendix A.

What factors are associated with the potential earnings of students who graduate with an associate degree or certificate from a Center of Excellence program?

Without access to student-level earnings data, we used historical data on earnings for certificate and associate degree holders in specific fields in the Chicago metropolitan statistical area to estimate Center of Excellence students’ potential annual earnings. (See Appendix B for information on how we created the measure of potential annual earnings.) On average, potential annual earnings were \$49,095 for certificate holders and \$55,887 for associate degree holders. However, there was variation across Center of Excellence programs. Potential earnings were highest for students in certificate programs in Construction Technology (\$71,774), followed by Information Technology (\$70,481) and Engineering and Computer Science (\$67,054) (Exhibit 15). Potential annual earnings were lowest for students in certificate programs in Education (\$34,113), followed by Culinary Arts and Hospitality (\$38,278) and Healthcare (\$40,735). In these lower paying fields, students in associate degree programs had higher potential earnings than students in certificate programs, but they mostly remained low relative to other fields (with the exception of Healthcare).

Exhibit 15. Potential Earnings of Center of Excellence Students, by Degree Program, 2017–18 to 2022–23 Entering Cohorts



Note. Earnings estimates are based on the credentials of the 5,041 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2022–23 and went on to earn a certificate (2,237 students) or an associate degree (2,804 students). Earnings estimates are based on the average estimated earnings associated with the Classification of Instructional Programs code of a student’s degree program.

Regression models

We used linear regression models to create adjusted predictions that describe potential earnings for students from a given race/ethnicity who earned a certificate or associate degree, after accounting for other factors. Model 1 shows potential earnings after accounting for race/ethnicity and entering cohort. Model 2 adds neighborhood characteristics, prior achievement, and gender. Model 3 adds Center of Excellence to capture variation in program characteristics.

Among certificate holders, students from other racial/ethnic backgrounds had the highest predicted potential earnings (Exhibit 16).⁹ After controlling for neighborhood characteristics, prior achievement, gender, and Center of Excellence programs, differences in predicted potential earnings between the lowest and highest earners (Asian students and students from other racial/ethnic backgrounds, respectively) narrowed from \$3,480 to \$2,587. For associate

⁹ Earnings differences are likely understated because we used educational and occupational averages to estimate potential earnings. There was no variation within these categories based on race/ethnicity, gender, or age. Further, these averages do not account for the selection of individuals into occupations.

degree holders, White students had the highest predicted potential earnings. After controlling for the full set of factors, differences in predicted potential earnings between the lowest and highest earners (White students and Black students) narrowed from \$2,827 to \$1,617.

Exhibit 16. Adjusted Predictions of Potential Earnings, by Degree, 2017–18 to 2020–23 Entering Cohorts

Degree	Race/ethnicity	Model 1	Model 2	Model 3
		Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender, Center of Excellence
		Percentage	Percentage	Percentage
Certificate	Asian	\$45,883	\$45,240	\$47,262
	Black	\$48,862	\$48,660	\$47,875
	Hispanic	\$46,590	\$47,562	\$47,868
	Other race/ethnicity	\$49,363	\$49,302	\$49,849
	White	\$48,678	\$46,729	\$47,241
Associate degree	Asian	\$57,549	\$56,994	\$56,781
	Black	\$56,416	\$57,321	\$57,416
	Hispanic	\$56,626	\$56,823	\$56,943
	Other race/ethnicity	\$57,940	\$58,316	\$58,342
	White	\$59,243	\$58,720	\$58,398

Note. The sample included 2,237 students who enrolled in a City College of Chicago for the first time between 2017–18 and 2022–23 and earned a certificate, and 2,804 students who earned an associate degree. “Other race/ethnicity” includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. Results are from a regression model predicting log earnings. Potential earnings are based on the average estimated earnings associated with the Classification of Instructional Programs code of a student’s degree. Full regression results are presented in Exhibit A5 in Appendix A.

Implications

This study found large racial/ethnic disparities in the workforce programs in which City Colleges of Chicago students enrolled; their rates of completion of certificates and associate degrees in each program; and their earnings. The study also found large differences by prior achievement and gender, though these differences only account for some of the disparities we

see by race/ethnicity. Neighborhood characteristics (such as distance to the college where the Center of Excellence program was housed) and racial/ethnic composition did not explain disparities by race/ethnicity.

Through interviews conducted with Center of Excellence students as part of the partnership, we know that a variety of factors shape students' enrollment decisions (Coca et al., 2024). Students often make decisions based on their desire for personal satisfaction, meaning, and joy, but their options may be constrained by geographic proximity, cost of attendance, and length of program. The quantitative findings suggest that geographic proximity is not as much of a barrier as we expected. It may be that norms, preferences, and other unmeasured factors matter more than potential structural barriers. These factors merit further systematic research through in-depth qualitative data collection and analysis.

In the meantime, City Colleges of Chicago may consider informational interventions to support students in making choices that best meet their needs and ensure they are prepared for success in the labor market. For instance, City Colleges could implement communication campaigns in K–12 settings to share with students the value of various workforce credentials in the labor market. Further, City Colleges could partner with Chicago Public Schools to expand access to dual enrollment programs to help students learn about workforce programs while making progress toward earning a credential.

Finally, there is a strong need for individual-level data on students' earnings after they leave college. Such data would enable a stronger analysis of labor market outcomes for City Colleges of Chicago students, and would perhaps suggest additional steps City Colleges could take (such as strengthening their ties to regional employers) to improve them.

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Appendix A. Full Results

Exhibits A1–A5 provide the full results from regression models summarized in the text.

Exhibit A1. Results From Linear Probability Models Predicting Enrollment in a Given Center of Excellence Program, 2017–18 to 2022–23 Entering Cohorts

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
Advanced Manufacturing			
Asian	-0.025 (0.004)***	-0.020 (0.004)***	-0.018 (0.004)***
Black	-0.019 (0.003)***	-0.020 (0.003)***	-0.016 (0.003)***
Hispanic	-0.009 (0.003)**	-0.010 (0.003)**	-0.006 (0.003)
Other	-0.011 (0.005)*	-0.011 (0.005)*	-0.008 (0.005)
Census: Pct Black		0.000 (0.000)	0.000 (0.000)
Census: Pct Hispanic		0.000 (0.000)	0.000 (0.000)
Census: Pct Other		0.000 (0.000)***	0.000 (0.000)**
Distance		0.000 (0.000)***	0.000 (0.000)***
ALEKS Math			-0.003 (0.001)***
ALEKS Math missing			0.013 (0.002)**
CCTRW			-0.003 (0.001)**
CCTRW missing			0.006 (0.002)**
Female			-0.035 (0.002)***
Unknown gender			-0.028 (0.016)
2018 cohort	0.002 (0.002)	0.002 (0.002)	0.003 (0.002)
2019 cohort	0.006 (0.002)**	0.006 (0.002)**	0.007 (0.002)**
2020 cohort	0.005 (0.002)	0.004 (0.002)	0.008 (0.002)**
2021 cohort	0.007 (0.002)**	0.007 (0.002)**	0.008 (0.002)**
2022 cohort	0.029 (0.003)***	0.029 (0.003)***	0.028 (0.003)***
Constant	0.026 (0.003)***	0.039 (0.005)***	0.045 (0.005)***
Business and Professional Services			
Asian	-0.027 (0.015)	-0.037 (0.013)**	-0.034 (0.013)*

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
Black	-0.034 (0.008)***	-0.026 (0.011)*	-0.017 (0.011)
Hispanic	-0.045 (0.008)***	-0.024 (0.009)**	-0.018 (0.009)
Other	0.003 (0.015)	0.008 (0.016)	0.012 (0.016)
Census: Pct Black		0.000 (0.000)	0.000 (0.000)
Census: Pct Hispanic		-0.001 (0.000)***	0.000 (0.000)**
Census: Pct Other		0.001 (0.000)	0.001 (0.000)
Distance		-0.001 (0.000)*	-0.001 (0.000)*
ALEKS Math			-0.004 (0.002)
ALEKS Math missing			0.001 (0.007)
CCTRW			0.010 (0.002)***
CCTRW missing			0.000 (0.006)
Female			-0.084 (0.005)***
Unknown gender			-0.105 (0.052)*
2018 cohort	0.007 (0.008)	0.007 (0.008)	0.007 (0.008)
2019 cohort	0.011 (0.007)	0.011 (0.007)	0.011 (0.007)
2020 cohort	-0.016 (0.008)	-0.016 (0.008)*	-0.015 (0.008)
2021 cohort	-0.017 (0.008)*	-0.017 (0.008)*	-0.020 (0.008)*
2022 cohort	-0.033 (0.008)***	-0.033 (0.008)***	-0.037 (0.008)***
Constant	0.297 (0.009)***	0.310 (0.014)***	0.307 (0.014)***
Construction Technology			
Asian	-0.048 (0.007)***	-0.043 (0.007)***	-0.041 (0.007)***
Black	-0.024 (0.006)***	-0.034 (0.006)***	-0.023 (0.006)***
Hispanic	-0.009 (0.006)	-0.013 (0.006)*	-0.005 (0.006)
Other	-0.015 (0.009)	-0.021 (0.009)*	-0.015 (0.009)
Census: Pct Black		0.000 (0.000)***	0.000 (0.000)***
Census: Pct Hispanic		0.000 (0.000)*	0.000 (0.000)**
Census: Pct Other		0.000 (0.000)	0.000 (0.000)
Distance		0.002 (0.000)***	0.001 (0.000)***
ALEKS Math			0.004 (0.001)**
ALEKS Math missing			0.017 (0.004)***
CCTRW			-0.016 (0.002)***

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
CCTRW missing			-0.009 (0.004)*
Female			-0.147 (0.003)***
Unknown gender			-0.056 (0.040)
2018 cohort	0.009 (0.004)*	0.009 (0.004)*	0.010 (0.004)*
2019 cohort	0.007 (0.004)	0.007 (0.004)	0.010 (0.004)*
2020 cohort	0.013 (0.005)**	0.013 (0.005)**	0.021 (0.005)***
2021 cohort	0.030 (0.005)***	0.030 (0.005)***	0.030 (0.005)***
2022 cohort	0.043 (0.005)***	0.043 (0.005)***	0.037 (0.005)***
Constant	0.086 (0.006)***	0.061 (0.010)*	0.126 (0.010)***
Culinary Arts and Hospitality			
Asian	0.010 (0.003)**	0.009 (0.003)**	0.009 (0.003)**
Black	0.036 (0.002)***	0.016 (0.003)***	0.008 (0.003)**
Hispanic	0.013 (0.002)***	0.006 (0.002)*	0.000 (0.002)
Other	0.029 (0.006)***	0.018 (0.006)**	0.014 (0.005)*
Census: Pct Black		0.000 (0.000)***	0.000 (0.000)***
Census: Pct Hispanic		0.000 (0.000)**	0.000 (0.000)*
Census: Pct Other		0.000 (0.000)	0.000 (0.000)
Distance		0.000 (0.000)***	0.000 (0.000)***
ALEKS Math			-0.006 (0.001)***
ALEKS Math missing			-0.006 (0.002)**
CCTRW			-0.012 (0.001)***
CCTRW missing			-0.009 (0.002)***
Female			0.000 (0.002)
Unknown gender			0.003 (0.023)
2018 cohort	0.000 (0.003)	0.000 (0.003)	0.000 (0.003)
2019 cohort	0.000 (0.003)	0.000 (0.003)	0.001 (0.003)
2020 cohort	-0.007 (0.003)*	-0.007 (0.003)*	-0.003 (0.003)
2021 cohort	-0.007 (0.003)*	-0.007 (0.003)*	-0.003 (0.003)
2022 cohort	-0.004 (0.003)	-0.003 (0.003)	0.000 (0.003)
Constant	0.011 (0.002)***	0.008 (0.004)*	0.019 (0.004)***

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
Education			
Asian	-0.009 (0.003)**	-0.010 (0.003)**	-0.010 (0.003)**
Black	0.005 (0.003)	-0.002 (0.003)	-0.006 (0.003)
Hispanic	0.006 (0.003)*	0.000 (0.003)	-0.003 (0.003)
Other	-0.010 (0.004)*	-0.014 (0.004)***	-0.016 (0.004)***
Census: Pct Black		0.000 (0.000)***	0.000 (0.000)**
Census: Pct Hispanic		0.000 (0.000)***	0.000 (0.000)**
Census: Pct Other		0.000 (0.000)	0.000 (0.000)
Distance		0.000 (0.000)	0.000 (0.000)
ALEKS Math			-0.002 (0.001)*
ALEKS Math missing			0.004 (0.002)
CCTRW			0.000 (0.001)
CCTRW missing			-0.004 (0.002)
Female			0.031 (0.002)***
Unknown gender			-0.007 (0.001)***
2018 cohort	-0.005 (0.002)*	-0.005 (0.002)*	-0.005 (0.002)*
2019 cohort	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)
2020 cohort	-0.012 (0.003)***	-0.012 (0.003)***	-0.012 (0.003)***
2021 cohort	0.000 (0.003)	0.000 (0.003)	0.001 (0.003)
2022 cohort	0.003 (0.003)	0.003 (0.003)	0.005 (0.003)
Constant	0.023 (0.003)***	0.016 (0.004)***	0.003 (0.004)
Engineering and Computer Science			
Asian	0.102 (0.014)***	0.094 (0.013)***	0.093 (0.013)***
Black	-0.060 (0.006)***	-0.029 (0.007)***	-0.011 (0.007)
Hispanic	-0.031 (0.006)***	-0.028 (0.007)***	-0.016 (0.006)*
Other	-0.031 (0.010)**	-0.014 (0.010)	-0.007 (0.01)
Census: Pct Black		0.000 (0.000)**	0.000 (0.000)
Census: Pct Hispanic		0.000 (0.000)	0.000 (0.000)*
Census: Pct Other		0.001 (0.000)	0.001 (0.000)
Distance		-0.001 (0.000)***	-0.001 (0.000)***
ALEKS Math			0.012 (0.002)***

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
ALEKS Math missing			-0.027 (0.005)***
CCTRW			0.01 (0.002)***
CCTRW missing			0.012 (0.004)***
Female			-0.148 (0.004)***
Unknown gender			-0.070 (0.039)
2018 cohort	-0.015 (0.005)**	-0.015 (0.005)**	-0.016 (0.005)**
2019 cohort	-0.008 (0.006)	-0.008 (0.006)	-0.011 (0.005)
2020 cohort	-0.012 (0.006)*	-0.013 (0.006)*	-0.015 (0.006)**
2021 cohort	-0.004 (0.006)	-0.004 (0.006)	-0.013 (0.006)*
2022 cohort	-0.011 (0.006)	-0.010 (0.006)	-0.020 (0.006)**
Constant	0.149 (0.006)***	0.149 (0.001)***	0.216 (0.010)**
Healthcare			
Asian	0.006 (0.015)	0.018 (0.014)	0.008 (0.013)
Black	0.066 (0.009)***	0.083 (0.012)***	0.037 (0.011)**
Hispanic	0.071 (0.008)***	0.071 (0.009)***	0.036 (0.009)***
Other	0.023 (0.016)	0.034 (0.016)*	0.010 (0.015)
Census: Pct Black		0.000 (0.000)**	-0.001 (0.00)***
Census: Pct Hispanic		0.000 (0.000)	-0.001 (0.00)***
Census: Pct Other		-0.001 (0.000)*	-0.001 (0.00)**
Distance		-0.003 (0.000)***	-0.001 (0.00)**
ALEKS Math			-0.001 (0.003)
ALEKS Math missing			-0.042 (0.007)***
CCTRW			0.011 (0.002)***
CCTRW missing			-0.019 (0.006)**
Female			0.430 (0.005)***
Unknown gender			0.172 (0.061)***
2018 cohort	-0.001 (0.008)	-0.001 (0.008)	-0.005 (0.008)
2019 cohort	-0.019 (0.009)*	-0.019 (0.009)*	-0.023 (0.008)**
2020 cohort	0.017 (0.009)	0.017 (0.009)	-0.004 (0.008)
2021 cohort	-0.050 (0.010)***	-0.050 (0.010)***	-0.046 (0.009)***
2022 cohort	-0.074 (0.009)***	-0.073 (0.009)***	-0.053 (0.008)***

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
Constant	0.400 (0.009)***	0.444 (0.014)***	0.275 (0.013)***
Information Technology			
Asian	-0.007 (0.003)*	-0.007 (0.004)*	-0.007 (0.004)*
Black	-0.005 (0.002)*	-0.001 (0.003)	0.001 (0.003)
Hispanic	-0.005 (0.002)*	-0.006 (0.002)*	-0.004 (0.002)
Other	-0.004 (0.004)	-0.003 (0.004)	-0.001 (0.004)
Census: Pct Black		0.000 (0.000)	0.000 (0.000)
Census: Pct Hispanic		0.000 (0.000)	0.000 (0.000)
Census: Pct Other		0.000 (0.000)	0.000 (0.000)
Distance		0.000 (0.000)*	0.000 (0.000)**
ALEKS Math			0.001 (0.001)
ALEKS Math missing			0.001 (0.002)
CCTRW			0.001 (0.001)*
CCTRW missing			0.005 (0.001)**
Female			-0.009 (0.001)***
Unknown gender			0.001 (0.016)
2018 cohort	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
2019 cohort	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
2020 cohort	0.007 (0.002)**	0.007 (0.002)**	0.007 (0.002)**
2021 cohort	0.024 (0.003)***	0.024 (0.003)***	0.023 (0.003)***
2022 cohort	0.020 (0.002)***	0.021 (0.002)***	0.020 (0.002)***
Constant	0.008 (0.002)***	0.009 (0.003)**	0.009 (0.003)**
Transportation, Distribution, and Logistics			
Asian	-0.002 (0.002)	-0.001 (0.002)	0.003 (0.003)
Black	0.034 (0.002)***	0.017 (0.003)***	0.03 (0.003)***
Hispanic	0.010 (0.002)***	0.005 (0.002)*	0.016 (0.002)***
Other	0.016 (0.005)**	0.007 (0.005)	0.015 (0.005)**
Census: Pct Black		0.000 (0.000)***	0.000 (0.000)***
Census: Pct Hispanic		0.000 (0.000)	0.000 (0.000)***
Census: Pct Other		0.000 (0.000)	0.000 (0.000)
Distance		0.000 (0.000)**	0.000 (0.000)*

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
ALEKS Math			-0.001 (0.001)*
ALEKS Math missing			0.041 (0.003)***
CCTRW			-0.002 (0.001)**
CCTRW missing			0.018 (0.002)***
Female			-0.041 (0.002)***
Unknown gender			0.092 (0.042)*
2018 cohort	0.003 (0.002)	0.003 (0.002)	0.005 (0.002)*
2019 cohort	0.005 (0.002)*	0.005 (0.002)*	0.007 (0.002)**
2020 cohort	0.005 (0.003)	0.005 (0.003)*	0.012 (0.003)***
2021 cohort	0.018 (0.003)***	0.018 (0.003)***	0.021 (0.003)***
2022 cohort	0.026 (0.003)***	0.027 (0.003)***	0.024 (0.003)***
Constant	0.000 (0.002)	0.004 (0.004)	-0.01 (0.005)*

* Statistically significant at $p < .05$; ** $p < .01$; *** $p < .001$.

Note. Bolded cells are statistically significant. The sample included 36,367 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2022–23. “Other” refers to students from another race/ethnicity, which includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. The reference group for race/ethnicity is White; the reference group for gender is male; and the reference group for cohort is 2017. ALEKS = Assessment and Learning in Knowledge Spaces placement exam; CCTRW = City Colleges Reading to Write placement exam; Pct = percentage.

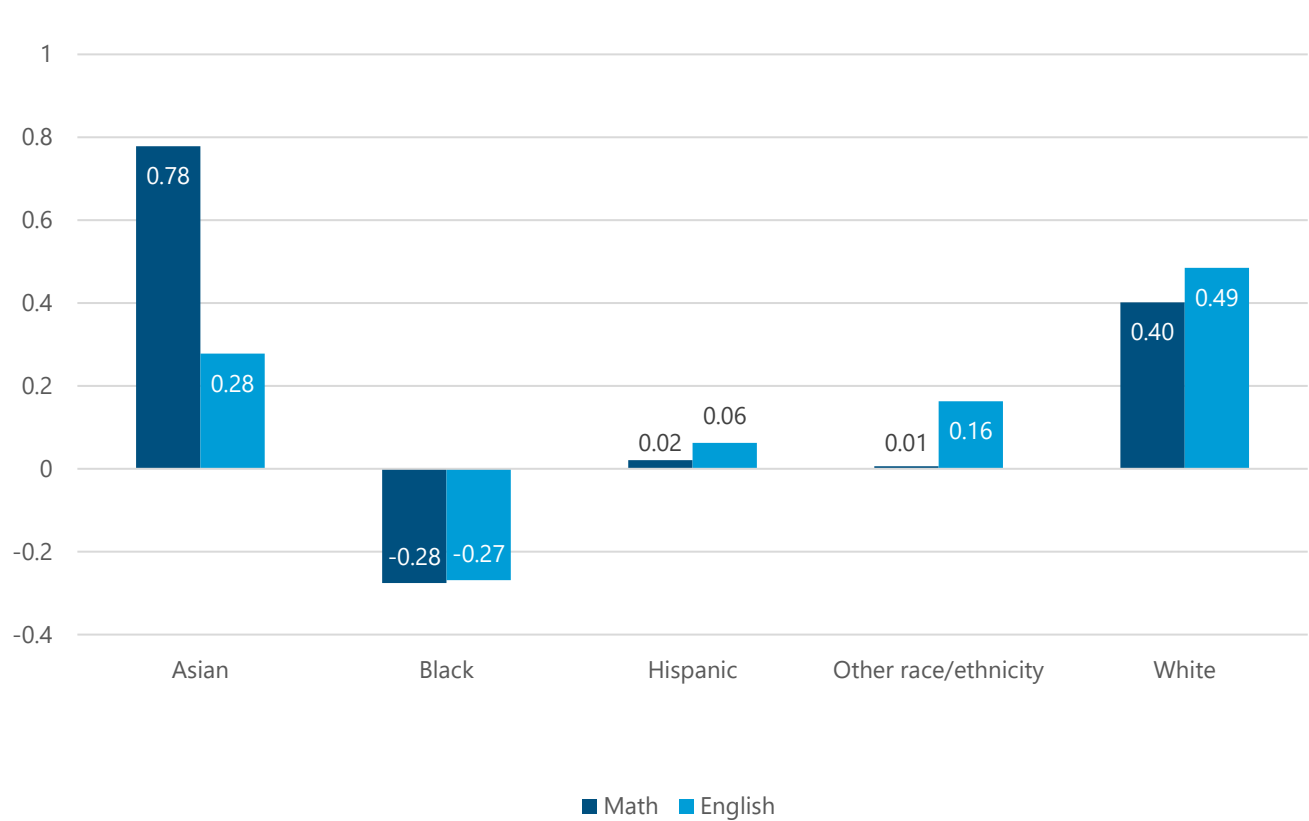
Exhibit A2. Adjusted Predictions of Enrollment in a Given Center of Excellence Program, 2017–18 to 2022–23 Entering Cohorts

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender	Change from Model 1 to Model 3
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)	Percent
Advanced Manufacturing				
Asian	0.85	1.4	1.19	40.0
Black	1.43	1.36	1.45	1.4
Hispanic	2.39	2.35	2.41	0.8
Other	2.25	2.27	2.21	-1.8
White	3.32	3.38	3.01	-9.3
Business and Professional Services				
Asian	26.4	24.2	23.9	-9.5
Black	25.8	25.4	25.7	-0.4
Hispanic	24.6	25.6	25.5	3.7
Other	29.4	28.7	28.5	-3.1
White	29.1	27.9	27.3	-6.2
Construction Technology				
Asian	5.3	6.3	5.7	7.5
Black	7.7	7.2	7.6	-1.3
Hispanic	9.3	9.3	9.4	1.1
Other	8.6	8.6	8.4	-2.3
White	10.1	10.7	9.9	-2.0
Culinary Arts and Hospitality				
Asian	1.8	2.8	3.3	83.3
Black	4.4	3.5	3.2	-27.3
Hispanic	2.1	2.5	2.4	14.3
Other	3.7	3.7	3.8	2.7
White	0.8	1.9	2.4	200.0
Education				
Asian	1.1	1.5	1.8	63.6
Black	2.6	2.3	2.2	-15.4
Hispanic	2.6	2.6	2.6	0.0

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender	Change from Model 1 to Model 3
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)	Percent
Other	1.1	1.2	1.2	9.1
White	2.0	2.6	2.8	40.0
Engineering and Computer Science				
Asian	24.3	22.3	21.0	-13.6
Black	8.1	10.0	10.6	30.9
Hispanic	11.0	10.1	10.1	-8.2
Other	11.0	11.5	11.0	0.0
White	14.1	12.9	11.7	-17.0
Healthcare				
Asian	38.7	39.2	40.7	5.2
Black	44.7	45.7	41.5	-7.2
Hispanic	45.2	44.5	44.4	-1.8
Other	40.4	40.7	44.3	9.7
White	38.1	37.4	41.7	9.4
Information Technology				
Asian	0.9	0.7	0.5	-44.4
Black	1.1	1.4	1.4	27.3
Hispanic	1.0	0.9	0.9	-10.0
Other	1.1	1.2	1.2	9.1
White	1.6	1.5	1.3	-18.8
Transportation, Distribution, and Logistics				
Asian	0.66	1.64	0.97	47.0
Black	4.26	3.41	3.63	-14.8
Hispanic	1.83	2.14	2.32	26.8
Other	2.43	2.34	2.14	-11.9
White	0.83	1.69	0.68	-18.1

Note. Bolded numbers represent a percentage change of more than 10%. The sample included 36,367 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2022–23. “Other” refers to students from another race/ethnicity, which includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity.

Exhibit A3. Entering Test Scores for Students Who Enrolled in a Center of Excellence Program, by Race/Ethnicity, 2017–18 to 2022–23 Entering Cohorts



Note. Test scores were standardized on the full sample of City Colleges of Chicago students to have a mean of 0 and a standard deviation of 1. The sample included 48,026 Center of Excellence and liberal arts students with mathematics test scores and 42,202 Center of Excellence and liberal arts students with English test scores. The sample sizes, for mathematics and English respectively, were 2,239 and 1,327 Asian students; 15,408 and 13,902 Black students; 23,794 and 21,935 Hispanic students; 1,595 and 1,374 students of other races/ethnicities; and 4,990 and 3,664 White students. “Other” refers to students from another race/ethnicity, which includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity.

Exhibit A4. Results From Multinomial Logistic Regression Models Predicting Completing a Certificate or Associate Degree Within 3 Years, 2017–18 to 2022–21 Entering Cohorts

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender, Center of Excellence
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
Certificate			
Asian	-0.601 (0.132)***	-0.511 (0.142)***	-0.488 (0.142)**
Black	-0.259 (0.076)**	-0.293 (0.097)**	-0.462 (0.099)**
Hispanic	-0.284 (0.073)***	-0.255 (0.085)**	-0.378 (0.088)***
Other	-0.216 (0.132)	-0.246 (0.140)	-0.339 (0.144)*
Census: Pct Black		0.004 (0.001)**	0.002 (0.001)
Census: Pct Hispanic		0.003 (0.001)*	0.002 (0.001)
Census: Pct Other		-0.009 (0.004)*	-0.007 (0.004)
Distance		-0.015 (0.007)*	-0.010 (0.006)
ALEKS Math		0.124 (0.024)***	0.139 (0.025)***
ALEKS Math missing		0.437 (0.054)***	0.287 (0.06)***
CCTRW		0.103 (0.024)***	0.157 (0.025)***
CCTRW missing		0.307 (0.053)***	0.248 (0.058)***
Female		-0.035 (0.047)	0.097 (0.058)
Unknown gender		0.473 (0.386)	-0.2 (0.416)
COE: Construction			1.861 (0.099)***
COE: Culinary			1.702 (0.135)***
COE: Education			1.154 (0.179)***
COE: Engineering			0.021 (0.139)
COE: Healthcare			1.342 (0.083)***
COE: IT			1.713 (0.271)***
COE: Manufacturing			2.510 (0.139)***
COE: TDL			3.534 (0.122)***
2018 cohort	0.030 (0.060)	0.059 (0.060)	0.011 (0.062)

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender, Center of Excellence
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
2019 cohort	0.141 (0.064)*	0.159 (0.065)*	0.108 (0.067)
2020 cohort	0.108 (0.071)	0.111 (0.072)	0.001 (0.074)
Constant	-1.976 (0.076)***	-2.261 (0.129)***	-3.258 (0.144)***
Associate degree			
Asian	0.098 (0.074)	0.083 (0.080)	0.071 (0.08)
Black	-1.030 (0.061)***	-0.410 (0.078)***	-0.408 (0.078)***
Hispanic	-0.466 (0.052)***	-0.189 (0.061)**	-0.179 (0.061)**
Other	-0.788 (0.118)***	-0.476 (0.122)***	-0.476 (0.123)***
Census: Pct Black		-0.006 (0.001)***	-0.007 (0.001)***
Census: Pct Hispanic		-0.001 (0.001)	-0.002 (0.001)
Census: Pct Other		-0.004 (0.002)	-0.004 (0.002)
Distance		0.001 (0.002)	0.001 (0.002)
ALEKS Math		0.281 (0.018)***	0.285 (0.019)***
ALEKS Math missing		0.119 (0.049)*	0.119 (0.050)*
CCTRW		0.248 (0.021)***	0.247 (0.021)***
CCTRW missing		0.496 (0.045)***	0.492 (0.045)***
Female		0.334 (0.036)***	0.367 (0.042)***
Unknown gender		-0.002 (0.491)	0.018 (0.494)
COE: Construction			-0.255 (0.088)**
COE: Culinary			0.528 (0.114)***
COE: Education			0.496 (0.109)***
COE: Engineering			0.201 (0.061)**
COE: Healthcare			-0.088 (0.049)
COE: IT			1.008 (0.230)***
COE: Manufacturing			-0.829 (0.249)**
COE: TDL			0.042 (0.201)

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender, Center of Excellence
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
2018 cohort	-0.082 (0.049)	-0.075 (0.050)	-0.068 (0.050)
2019 cohort	-0.052 (0.051)	-0.074 (0.052)	-0.074 (0.052)
2020 cohort	-0.247 (0.057)***	-0.346 (0.059)***	-0.340 (0.059)***
Constant	-1.033 (0.053)***	-1.542 (0.088)***	-1.539 (0.091)***

* Statistically significant at $p < .05$; ** $p < .01$; *** $p < .001$.

Note. The sample included 25,892 Center of Excellence students who first enrolled in a City College of Chicago between 2017–18 and 2020–21. Results are from multinomial logistic regression models predicting attaining a certificate or associate degree relative to no degree. “Other” refers to students from another race/ethnicity, which includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. The reference group for race/ethnicity is White; the reference group for gender is male; the reference group for cohort is 2017; and the reference group for Center of Excellence is Business and Professional Services. ALEKS = Assessment and Learning in Knowledge Spaces placement exam; CCRTW = City Colleges Reading to Write placement exam; COE = Center of Excellence; IT = Information Technology; Pct = percentage; and TDL = Transportation, Distribution, and Logistics.

Exhibit A5. Results From Regression Models Predicting Log Potential Earnings, by Degree, 2017–18 to 2022–23 Entering Cohorts

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender, Center of Excellence
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
Certificate			
Asian	-0.059 (0.040)	-0.032 (0.040)	0.000 (0.028)
Black	0.004 (0.022)	0.04 (0.026)	0.013 (0.017)
Hispanic	-0.044 (0.021)*	0.018 (0.024)	0.013 (0.016)
Other	0.014 (0.039)	0.054 (0.042)	0.054 (0.03)
Census: Pct Black		0.000 (0.000)	0.000 (0.000)
Census: Pct Hispanic		0.000 (0.000)	0.000 (0.000)
Census: Pct Other		0.000 (0.001)	0.000 (0.001)

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender, Center of Excellence
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
Distance		0.008 (0.001)***	0.002 (0.001)**
ALEKS Math		0.007 (0.007)	-0.004 (0.005)
ALEKS Math missing		-0.037 (0.017)*	-0.015 (0.012)
CCTRW		-0.015 (0.006)**	-0.006 (0.004)
CCTRW missing		0.042 (0.017)*	0.023 (0.012)
Female		-0.226 (0.012)***	0.006 (0.013)
Unknown gender		-0.069 (0.053)	-0.028 (0.062)
COE: Construction			0.267 (0.021)***
COE: Culinary			-0.343 (0.020)***
COE: Education			-0.418 (0.032)***
COE: Engineering			0.227 (0.043)***
COE: Healthcare			-0.292 (0.018)***
COE: IT			0.235 (0.032)***
COE: Manufacturing			0.070 (0.020)***
COE: TDL			-0.033 (0.022)
2018 cohort	-0.022 (0.018)	-0.035 (0.017)*	-0.025 (0.012)*
2019 cohort	-0.026 (0.017)	-0.034 (0.016)*	-0.042 (0.012)**
2020 cohort	-0.031 (0.018)	-0.018 (0.018)	-0.022 (0.013)
Constant	10.812 (0.022)***	10.843 (0.037)***	10.899 (0.031)***
Associate degree			
Asian	-0.029 (0.009)**	-0.03 (0.011)**	-0.028 (0.01)**
Black	-0.049 (0.008)***	-0.024 (0.011)*	-0.017 (0.01)
Hispanic	-0.045 (0.006)***	-0.033 (0.008)***	-0.025 (0.007)***
Other	-0.022 (0.013)	-0.007 (0.016)	-0.001 (0.013)
Census: Pct Black		0.000 (0.000)**	0.000 (0.000)
Census: Pct Hispanic		0.000 (0.000)*	0.000 (0.000)*
Census: Pct Other		0.000 (0.000)	0.000 (0.000)
Distance		0.000 (0.001)	0.000 (0.001)
ALEKS Math		0.003 (0.003)	0.001 (0.002)
ALEKS Math missing		0.021 (0.007)**	0.015 (0.005)**

Center of Excellence and characteristic	Race/ethnicity and cohort	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender	Race/ethnicity, cohort, distance, neighborhood characteristics, prior achievement, gender, Center of Excellence
	Coefficient (standard error)	Coefficient (standard error)	Coefficient (standard error)
CCTRW		0.004 (0.003)	0.002 (0.003)
CCTRW missing		0.010 (0.006)	0.003 (0.005)
Female		-0.002 (0.005)	-0.001 (0.004)
Unknown gender		0.084 (0.061)	0.078 (0.044)
COE: Construction			0.129 (0.024)***
COE: Culinary			-0.145 (0.014)***
COE: Education			-0.094 (0.016)***
COE: Engineering			-0.004 (0.005)
COE: Healthcare			0.077 (0.005)***
COE: IT			0.155 (0.022)***
COE: Manufacturing			0.036 (0.019)
COE: TDL			0.095 (0.013)***
2018 cohort	-0.003 (0.006)	0.005 (0.007)	0.004 (0.006)
2019 cohort	-0.008 (0.007)	-0.004 (0.007)	-0.002 (0.006)
2020 cohort	-0.008 (0.007)	-0.011 (0.008)	-0.014 (0.007)*
Constant	10.994 (0.006)***	10.997 (0.013)***	10.966 (0.01)***

* Statistically significant at $p < .05$; ** $p < .01$; *** $p < .001$.

Note. The sample included 2,237 students who enrolled in a City College of Chicago for the first time between 2017–18 and 2022–23 and earned a certificate, and 2,804 students who earned an associate degree. Results are from a regression model predicting log earnings. Potential earnings are based on the average estimated earnings associated with the Classification of Instructional Programs code of a student's degree. "Other" refers to students from another race/ethnicity, which includes students who identified as American Indian, Hawaiian/Pacific Islander, or multiracial non-Hispanic, and students who did not specify their race/ethnicity. The reference group for race/ethnicity is White; the reference group for gender is male; the reference group for cohort is 2017; and the reference group for Center of Excellence is Business and Professional Services. ALEKS = Assessment and Learning in Knowledge Spaces placement exam; CCTRW = City Colleges Reading to Write placement exam; COE = Center of Excellence; IT = Information Technology; Pct = percentage; and TDL = Transportation, Distribution, and Logistics.

Appendix B. Research Methods

This appendix describes how the study team conducted the quantitative analyses presented in this report, including the samples, measures, and analytic methods.

Data and sample

This study used student-level administrative data from the City Colleges of Chicago from 2017 to 2023. The data included information on students' enrollment histories, program of enrollment, demographic information, and credential attainment. The data from the City Colleges of Chicago also included students' residential addresses at the time of enrollment. We created our sample using information on when students first entered a credential-bearing program. Our sample consisted of students who first entered in the 2017–18 to 2022–23 academic years. The sample comprised 64,269 students who first enrolled in either a Center of Excellence program ($n = 36,569$) or a liberal arts major ($n = 27,700$). There are nine Centers of Excellence in the City Colleges.

In addition to the administrative data, we used data from the U.S. Census and the American Community Survey (ACS). We used Census data on the earnings of full-time earners in the Chicago area with an associate degree or 1 year of college. The ACS is an ongoing survey conducted by the U.S. Census Bureau which documents the characteristics of communities on a yearly basis.¹⁰ We used information on the average socioeconomic characteristics of Census tracts in Chicago from 2018 to 2022 using the 5-year ACS.

Measures

The “treatment” of interest was whether students were enrolled in a Center of Excellence program, and which program. We compared outcomes among students enrolled in each of these centers. We identified students' first center of enrollment and their last center of enrollment. In some analyses of credential completion, we used students' last program, but in the majority of analyses, we used students' first program. Approximately 21% of students in our sample who first enrolled in a Center of Excellence switched programs. The most common program switch was from Center of Excellence to a liberal arts major (72%). Note that some students may have earned a credential in the Center of Excellence field prior to switching programs.

¹⁰ <https://www.census.gov/programs-surveys/acs/about.html>

A key outcome of interest was whether a student earned a credential (either a certificate or an associate degree) within 3 years of program entry. We examined each credential separately and whether a student obtained any credential.

Our second outcome of interest was labor market earnings. We did not have access to student-level earnings data. Instead, we estimated the potential earnings of credential completers using data from the Census and the National Center for Education Statistics (NCES) Classification of Instructional Programs (CIP) to Standard Occupational Classification (SOC) crosswalk.¹¹ Our approach was as follows. We identified full-time workers with an associate degree or 1 year of college in the greater Chicago region between 2018 and 2023. We aggregated Census data by SOC code and level of education and calculated average earnings using the provided person weights. We excluded the top and bottom 5% of earners. All earnings were inflated to 2023 dollars using the Consumer Price Index (CPI). We matched the CIP codes of graduates to the SOC codes of workers using the NCES crosswalk. We calculated the average earnings associated with a given CIP code. Given that more than one occupation may match to a CIP code, we constructed weighted averages where the proportion of workers in an occupation was the weight (e.g., among those with an associate degree in nursing, 80% are registered nurses and 20% are nursing instructors, so the weights are 0.8 and 0.2, respectively).

We note several assumptions and limitations regarding our approach that require cautious interpretation of results. The approach assumes that the Census sample is representative of City College of Chicago graduates. Further, because we were not able to identify workers' years of experience, we refer to earnings as "potential" estimated earnings and recognize that they may not represent initial earnings after credential receipt. Given the small sample sizes in the Census data, we did not calculate average potential earnings separately by race or gender. We were unable to differentiate earnings differences between graduates from different City Colleges, and the approach did not account for graduates who entered occupations outside of their degree field.

The demographic measures we used were student gender (female, male, and unknown), student race/ethnicity (Asian, Black, Hispanic, other race/ethnicity, and White), and student age at entry. "Other race/ethnicity" included students for whom race/ethnicity was unknown or missing.

The data set included measures of students' scores on academic placement tests. We used scores from the Assessment and Learning in Knowledge Spaces (ALEKS) mathematics

¹¹ IPUMS USA (<https://usa.ipums.org/usa/>)

assessment and the City Colleges Reading to Write (CCRTW) assessment. We used these particular placement test scores because they were the modal tests when this study was conducted. One limitation of these measures is that 25% of students in our sample were missing ALEKS scores and 34% were missing CCRTW scores. We filled in missing scores with the average score in the sample, and we included an indicator variable for students with missing scores in our analytic models. Students who were missing these scores may have submitted scores from other exams (for example, SAT or Advanced Placement) in lieu of taking these placement tests. We standardized all scores within the sample (mean of 0 and standard deviation of 1) such that a score of 0 represents the sample average score.

We used students' residential addresses at the time of enrollment to calculate the distance from a student's home to each of the nine City Colleges of Chicago and to identify the nearest City College. Our measure was the straight-line (i.e., Euclidean) distance, measured in miles. We also used students' residential addresses to identify the Census tract in which their residence was located. We merged socioeconomic characteristics of the Census tract including demographic composition, educational attainments, and average household income. Given the strong correlations between the percentage of Census tract residents who are White and the percentage with a bachelor's degree ($r=0.62$) and median household income ($r=0.64$), our models only used measures of the demographic composition (percentage of residents who are Black, percentage who are Hispanic, percentage who are another race/ethnicity, and percentage who are White). There were 411 students with out-of-state addresses, for whom we did not calculate distance metrics or Census tract characteristics; we excluded these students from the regression models.

Methods

To examine the relationships between the City College in which students enrolled and their demographic characteristics, place of residence, and prior academic achievement, we fit separate linear probability models with enrollment in a particular City College as the outcome. These models estimated the probability of enrolling in a specific City College relative to all other colleges. We included both Center of Excellence and liberal arts students in these models. We clustered standard errors at the Census tract level. We estimated adjusted predictions for each racial/ethnic group using the margins command in STATA.

We used the same approach to examine the relationships between a student's Center of Excellence enrollment (with separate models for each Center of Excellence program) and their demographic characteristics, place of residence, and prior academic achievement, with one key difference. In these models, we only included Center of Excellence students, which meant that

these models compared the probability of enrolling in a specific Center of Excellence relative to enrolling in all the other Centers of Excellence. We estimated adjusted predictions as described above.

We used multinomial logistic regression models to estimate the probability of completing an associate degree or a certificate within 3 years, relative to not earning a credential, for Center of Excellence students. This sample comprised Center of Excellence students in the 2017–18 to 2020–21 entry cohorts ($n = 25,892$) to allow sufficient time for credential completion.

To examine the relationships between earnings, Centers of Excellence, demographic characteristics, place of residence, and achievement, we regressed the natural log of earnings first on demographics, entry cohort, and year fixed effects. We then included prior achievement, Center of Excellence, and Census tract characteristics in the model. We examined these relationships separately for students who earned a certificate as their highest credential ($n = 3,861$) within 3 years of entry and for students who earned an associate degree as their highest credential ($n = 7,349$).

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